# Retirement Systems of Minnesota

Minnesota State Retirement System • Public Employees Retirement Association • Teachers Retirement Association

# ADEQUACY OF PUBLIC PENSIONS

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*An analysis performed by the Public Employees Retirement Association,*
*Minnesota State Retirement System, and Teachers Retirement Association*

### THE GOAL OF OUR ANALYSIS

To evaluate whether the retirement benefits provided by the three major public pension funds in combination with Social Security benefits and personal savings provide satisfactory levels of retirement income. We offer this report to the Legislative Commission on Pensions and Retirement hoping it may be useful in completing the study mandated by the 2008 Minnesota Legislature to study the adequacy of the Teachers Retirement Association benefit plan. PERA and MSRS joined the analysis with TRA to provide an assessment of the sufficiency of the retirement benefits for state and local employees.

### OUR APPROACH

We took the widely-accepted "Three-Legged-Stool" approach to determine the sufficiency of retirement income as the combination of: Social Security benefits, a Minnesota public pension, and personal savings. Our analysis was of single-life benefits for three example end-of-career salary levels: $30,000; $50,000; and $80,000. Retirement professionals generally agree that retirees may retain their "working" standards of living when their retirement incomes are 80% or 90% of pre-retirement levels. (More on this on page 2 where we discuss the Georgia State AON Consulting Replacement Ratio Study.)

Listed are three major premises upon which we conducted our analysis. Others are discussed in *Assumptions Used in Benefit Analysis*, which is among the items in the attachments accompanying our report. The three premises are:

- We examined plans for teachers participating in TRA and general service employees participating in PERA and MSRS who contribute to Social Security in addition to their public pensions.
- We assumed career public employees are retiring after 30 years of service at the normal retirement ages of 65 and 66 and at an early retirement age of 62.
- We calculated estimates of the necessary personal savings the member needed during his or her work career when the combined Minnesota pension and the Social Security benefit produced replacement ratios under 80% and 90%.

### SHORT DESCRIPTION OF FINDINGS

We found that our Minnesota plans combined with Social Security benefits and modest levels of personal savings provide a satisfactory level of economic resources for public employees who retire at the normal retirement ages of 65 or 66, when their retirement salaries are $30,000 and $50,000. However, members retiring at 65 or 66 with salaries of $80,000 must each month save around 2.5% - 5.0% of their working salaries to attain 80% or 90% of their pre-retirement salary.

If planning to retire early, it is more of a challenge for public employees to maintain their pre-retirement living standards. Personal savings rates must be relatively high for members who plan to retire at age 62. Depending on salary level at retirement, members with pre-

1989 (Tier I) benefits, for example, need to save an estimated 3.7% - 9.7 % of their gross salaries throughout their 30

years of public service to maintain their employment standards of living at 90% of their pre-retirement earnings.[*] Required savings levels are even higher for members with post 1989 (Tier II) benefit levels. Again, depending upon the level of retirement salary, to reach 90% of pre-retirement salary, Tier II members need to save approximately 6.8% to 10.5% of their gross salary during 30 years of work. These savings rates are in excess of the actual saving rates observed in the U.S. (see "pre-retirement personal savings rate" statistics on p. 3 of the "Assumptions."

## THE 2008 GEORGIA STATE-AON RETIREMENT STUDY

Our analysis relies on the notion that retirees need to develop sources of income that "replace" what they received as salary during their working careers. Specifically, we looked to the Georgia State University and AON Consulting Company's 2008 Replacement Ratio Study to guide the analysis of the retirement benefits of our three systems.

In the past, traditional approaches to financial planning for retirement assumed that to maintain their standards of living, retirees must raise their income levels by the increases in the cost of living. More recent research about retirement, however, has found that because a number of expenses decrease in retirement from what they were during work, retirees in fact may maintain their standards of living with lower levels of income.[†]

Retirement professionals use "replacement ratio" goals to determine the economic needs of employees planning for their post-work lives. For example, if it is estimated retirees need 10% less income over what they required during work, the replacement ratio model states that workers need to "replace" 90% of their salaries with other sources when they retire.

Using data collected by the U. S. Bureau of Labor Statistics with its Consumer Expenditure Survey (CES), Georgia State University and AON Consulting Company have for about 20 years compared the expenditures of retirees with those of workers. Their 2008 Replacement Ratio Study reports that retirees should be able to maintain their

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[*] Legislative changes enacted in 1989 changed benefit levels for members enrolled in PERA, TRA, and MSRS on or after July 1, 1989 and who worked until "normal" retirement age (which is tied to Social Security's full retirement ages). At the same time, the legislation eliminated Rule of 90 for these Tier II (post-1989) members and it increased reductions for retiring before normal retirement age. Benefits are calculated two ways for Tier I (pre-1989 members), who retain their potential eligibility for Rule of 90 and lower penalties for early retirement. Tier I members receive the higher of Tier I or Tier II benefits.

[†] Associated Press story, June 27, 2005. Ty Bernicke of Bernicke and Associates Ltd of Eau Claire Wisconsin uses the term "traditional" financial planning strategy to describe the approach which would have workers tie their savings goals to future and unknown increases in the cost of living following their retirements. As does AON Consulting, Bernicke cited data from the BLS's Expenditure Survey to show that except for health care, many expenses decrease for retired workers and they can therefore retain their standards of living with lower incomes.

standards of living when their retirement incomes are 80% or 90% of the level of those during work. The study suggests that although retirees' health care expenses increase, many other expenses decrease. For example, non-working retirees no longer pay Social Security taxes on employment earnings or need to save for retirement. Consumer Expenditure Survey data also indicate that retirees spend less on transportation, food, entertainment, and housing. (More information about the Replacement Ratio Study may be found at Aon.mediaroom.com.)

## MORE ABOUT OUR ANALYSIS

This section of our report contains one table for MSRS, PERA, and TRA each of which shows example retirement benefits provided by our three retirement systems and the Social Security benefits associated with those benefits. Our tables use three example retirement salary levels, $30,000; $50,000; and $80,000. We calculated 80% and 90% of these salaries, which represent their respective 80% and 90% replacement ratio goals.

Eighty percent (80%) of the $30,000 salary is $24,000 annually and $2,000 per month. Ninety percent (90%) of $30,000 is $27,000 annually and $2,250 per month. Therefore, members planning for 80% of their salaries must have $2,000 to cover their expenses during retirement.

A 65-year-old member with a salary at retirement of $30,000 and with 30 years of service has earned a $1,203-per-month pre-1989 benefit from MSRS or PERA. The Social Security benefit associated with this 30-year pension is $1,090 per month. Combining the pension and Social Security benefit results in $2,293 per month as retirement income. The $2,293 exceeds the target goals of both 80% and 90%.

In contrast, however, the proportion of income a pension and Social Security replaces for those whose retirement incomes are $80,000 is always below 90% and generally below 80% as well. For example, the PERA pension and Social Security benefit combined provides 76.6% of an $80,000 salary for the pre-1989 member at age 65.

Two things about the $80,000 salary level. One is that researchers suggest that living standards may be maintained with smaller replacement ratios for those whose salaries are at higher levels. Therefore, perhaps the 76.6% ratio could be reasonable for the $80,000 salary. In *Assumptions Used in Benefit Analysis* in the attachments. AON suggests ratios of 77% to 78% retain a working standard of living for married couples whose salaries are from $70,000 to $90,000.

Moreover, AON observed personal savings levels of 4.91% to 5.57% for individuals in the $70,000 to $90,000 salary ranges. (See *Assumptions Used in Benefit Analysis*.) These rates are roughly 1.5 to 2.5 times of the rates of salaries of $20,000 to $40,000, suggesting it is reasonable to believe individuals with higher salary levels not only have the ability to save more, they actually do.

Our tables show the results of carrying out these replacement ratio calculations for both pre-1989 and post-1989 benefits for our three retirement salary levels. We also show benefits for the normal retirement ages of 65 (pre-1989) and 66 (post-1989), and early retirement for age 62. When replacement ratios fell below 80% or 90%, we computed the dollar amounts that would be needed monthly to bring incomes up to the 80% and 90% replacement levels. Using average expected lifetimes of members after retirement,

we calculated the amount of personal savings members would need to accumulate during their working careers to supply the monthly dollar shortfalls.

To illustrate the importance of disciplined saving for retirement, with the assistance of calculators we found on the Internet, we derived the rates at which members need to save during work to attain the various savings account levels needed at retirement.[‡] We assumed that while working, members could over the long term expect an average annual 7% return while accumulating their savings.

Our spreadsheets show that in most instances retirees need to draw from their personal savings to meet their normal living expenses. The funds that remain in their savings accounts will earn some level of interest or investment return. Retirees need a stable stream of income to meet their expenses. To gain that security, they would likely use lower-risk investments that provide lower rates of return on their retirement savings. For our analysis, we assumed that retirees could expect a 4% return from their savings accounts. We have additional spreadsheets in our attachments which assume 5% and 3% rates of return to illustrate the need to save more while working if investment returns are less than 7% and 4%.

## RESULTS OF OUR ANALYSIS

### Social Security

As our respective spreadsheets illustrate that Social Security benefits are a major "leg" of the retirement income stool. Unlike MSRS, PERA, and TRA's pensions, Social Security benefits are computed using the worker's lifetime earnings, which are brought to a current dollar equivalent by adjusting past earnings to inflation. Social Security calls this Average Indexed Monthly Earnings (AIME). Social Security calculates benefits using proportions of AIME in three levels. All Social Security recipients are eligible for level 1, which is 90% of AIME up to $711, which is about $640. Workers receive 32% of any level 2 amount ( the wages between $711 and $4,288), and level 3 is 15% of AIME over $4,288.

Describing the general Social Security benefit formula shows how workers with a history of low salaries are awarded a greater proportion of their AIMEs than workers who have higher levels of earnings. This benefit calculation presumably recognizes that workers with lower incomes must devote greater proportions of their salaries to meet their basic every-day expenses. The weighting in favor of lower salary levels shows up in our benefit adequacy spreadsheets. For example, workers with retirement salaries of $80,000 receive larger Social Security benefits than their counterparts whose retirement salaries are $30,000. But the Social Security benefit is a greater proportion of total retirement income for workers whose salaries are $30,000 rather than $80,000.

We do not attempt in our analysis to illustrate the effects of inflation adjustments on Social Security benefits or our public pensions. It is noteworthy, however, that with the expected dissolution of the Post Fund, our pension benefits will be increased by a fixed 2.5% per year.  Social Security's inflation adjustments, however, are not fixed or capped and in fact Social Security will pay a 5.8% increase in benefits on January 1, 2009.

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[‡] http://www.finaid.org/calculators/savingsplanpercent.phtml is an aid to parents to determine how much they need to save for their children's college expenses.

**Medicare and health expenditures**

The plans we have analyzed are all coordinated with Social Security and members will collect their Minnesota pensions in addition to Social Security benefits. As Social Security participants, Minnesota pensioners are eligible for Medicare when they reach age 65. AON's Replacement Ratio Report's "worst-case" health-care scenario estimates these costs will increase by an estimated $400, which is an estimated cost of Medicare parts B and D. (Part D premiums vary by the plan chosen.). Some of the medical expenses retired employees incur will be covered by Medicare. Retirees, however, will need to purchase Medigap insurance to help defray costs not covered by Medicare. Nonetheless, with health care costs continuing to rise, public employees may find that they will need to increase their savings in anticipation of further cost increases and perhaps set replacement ratio goals higher than 80% and 90%.

Notwithstanding increases in health care costs, workers in the lower salary ranges need to go beyond replacement ratios of 80% and 90%. For example, the AON reports in the table replacement ratios over 100% for the $20,000 and $30,000 income levels in its estimate of health care costs "worst-case" scenario.

| Under AON's health care costs "worst-case" scenario | |
| --- | --- |
| Retirement salary | Replacement ratio |
| $20,000 | 113% |
| $30,000 | 102% |
| $40,000 | 94% |
| $50,000 | 88% |
| $60,000 | 84% |
| $70,000 | 82% |
| $80,000 | 82% |
| $90,000 | 82% |

Stating the obvious perhaps, replacement ratios in excess of 100% mean employees must plan to increase their incomes following retirement. In reality, however, employees whose salaries are in the lower ranges are probably less able than others to increase their post-retirement incomes.

It is unclear the degree to which nursing home costs are incorporated in AON's analysis, potentially as medical or housing expenditures. AON uses data from the Bureau of Labor Statistics' Consumer Expenditure Survey to measure pre- and post-retirement spending behavior. Residents of nursing homes may be represented in BLS's survey, but it is not obvious that they are.[§]

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[§] Associated Press story, June 27, 2005. Ty Bernicke of Bernicke and Associates Ltd of Eau Claire Wisconsin

## Graphical examples

In the next several pages we show charts that depict some of the results of our analysis. Pages 7 and 8 have graphics focusing on the $50,000 annual salary at retirement for the three funds for post-1989 members retiring at age 66. The charts on pages 9 through 12 depict sources of retirement income for all three salary ranges: $30,000; $50,000; and $80,000.

When **TRA**'s working-level salary is $50,000, $45,000 (90%) estimated to continue standard of living into retirement

Sources of retirement income
*Monthly* amounts for $50,000:

| | | |
|---|---|---|
| TRA pension | $2,217 | 59.1% |
| Social Security | $1,560 | 41.6% |
| Personal savings $ | 0 | 0.0% |
| Total | $3,777 | 100.7% |
| 90% | $3,750 | |

Personal savings 0.0%

41.6% Social Security benefit 35 years

59.1% TRA Coordinated Plan pension 30 years Age 66 post-1989
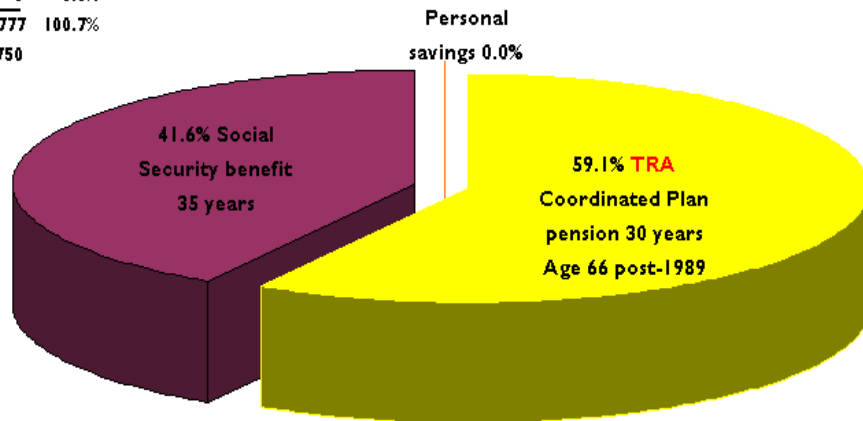
**When MSRS's work-level salary at retirement is $50,000,
$45,000 (90%) estimated to maintain that
standard of living into retirement
Retirement age: 66
Post 1989**

**Sources of retirement income**
*Monthly* **amounts for $50,000:**
**MSRS pension    $2,005   53.5%**
**Social Security  $1,560   41.6%**
**Personal savings $ 185     4.9%**
**Total            $3,750  100.%**
**$3,750 is 90% of a monthly salary**
**$4,167**

**4.9%
Personal savings**

**41.6% Social
Security benefit
35 years of service**

**53.5% MSRS General
Plan pension 30 years**
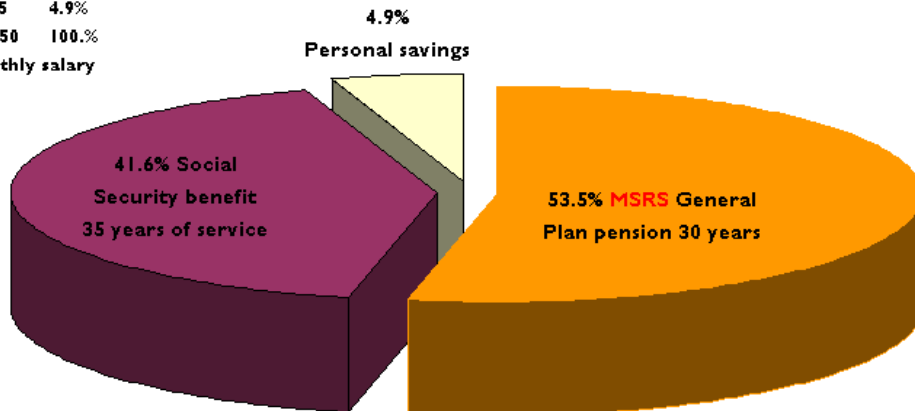
**When PERA's work-level salary at retirement is $50,000,
$45,000 (90%) estimated to maintain that
standard of living into retirement
Retirement age: 66
Post 1989**

**Sources of retirement income**
*Monthly* **amounts for $50,000:**
**PERA pension    $2,005   53.5%**
**Social Security  $1,560   41.6%**
**Personal savings $ 185     4.9%**
**Total            $3,750  100.%**
**$3,750 is 90% of a monthly salary**
**$4,167**

**4.9%
Personal savings**

**41.6% Social
Security benefit
35 years of service**

**53.5% PERA
Coordinated Plan
pension 30 years**
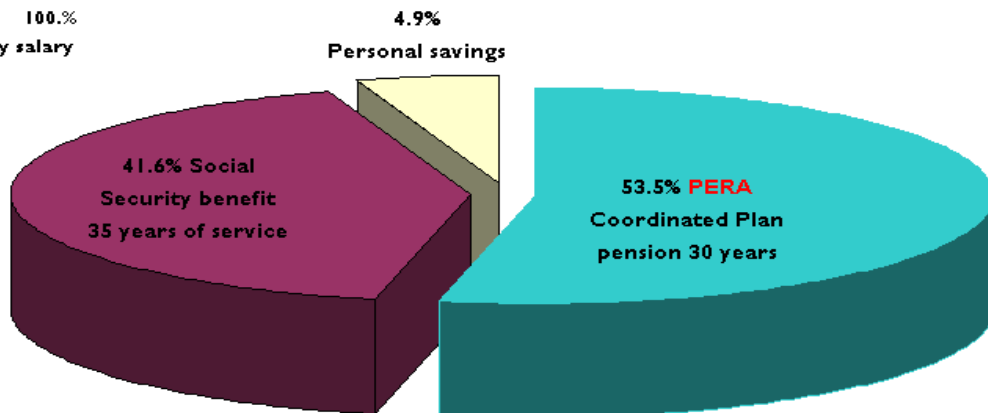
**Replacement ratios\* for three retirement salary levels**
*Pre-1989 Teachers Retirement Association 30- year pensions*
*combined with Social Security benefits at age 65*

*Combined total: $5,229*
*replacement ratio: 78.4%*

**Monthly benefits**
■ Social Security
■ TRA pension

*Combined total: $3,636*
*replacement ratio: 87.2%*

**Social Security $1,908 36.5%**

*Combined total $2,335*
*replacement ratio: 93.4%*

**Social Security $1,560 42.9%**

**TRA pension $3,321 63.5%**

**Social Security $1,090 46.7%**

**TRA pension $2,076 57.1%**

**TRA pension $1,245 53.3%**

Figure 1 | **$30,000** | **$50,000** | **$80,000**

**Annual salary at retirement**

\*Workers maintain their standards of living when replacing 80% of working salary by other sources in retirement

**Replacement ratios\* for three retirement salary levels**
*Post-1989 Teachers Retirement Association 30- year pensions*
*combined with Social Security benefits at age 66*

*Combined total: $5,455*
*replacement ratio: 81.8%*

**Monthly benefits**
■ Social Security
■ TRA pension

*Combined total: $3,777*
*replacement ratio: 90.6.%*

**Social Security $1,908 35.0%**

*Combined total $2,420*
*replacement ratio: 96.8%*

**Social Security $1,560 41.3%**

**TRA pension $3,547 65.0%**

**Social Security $1,090 45.0%**

**TRA pension $2,217 58.7%**

**TRA pension $1,330 55.0%**

Figure 2 | **$30,000** | **$50,000** | **$80,000**

**Annual salary at retirement**

\*Workers maintain their standards of living when replacing 80% of working salary by other sources in retirement

**Replacement ratios\* for three retirement salary levels**

*Pre- and post-1989* **PERA** *30-year pensions combined with Social Security benefits at ages* **65** *and* **66**

*Combined total: $5,115 replacement ratio: 76.7%*

**Monthly benefits**
■ Social Security
■ PERA pension

*Combined total: $3,565 replacement ratio: 85.6%*

**Social Security $1,908 37.3%**

*Combined total $2,293 replacement ratio: 91.7%*

**Social Security $1,560 43.8%**

**PERA pension $3,208 62.7%**

**Social Security $1,090 47.5%**

**PERA pension $2,005 56.2%**

**PERA pension $1,203 52.5%**

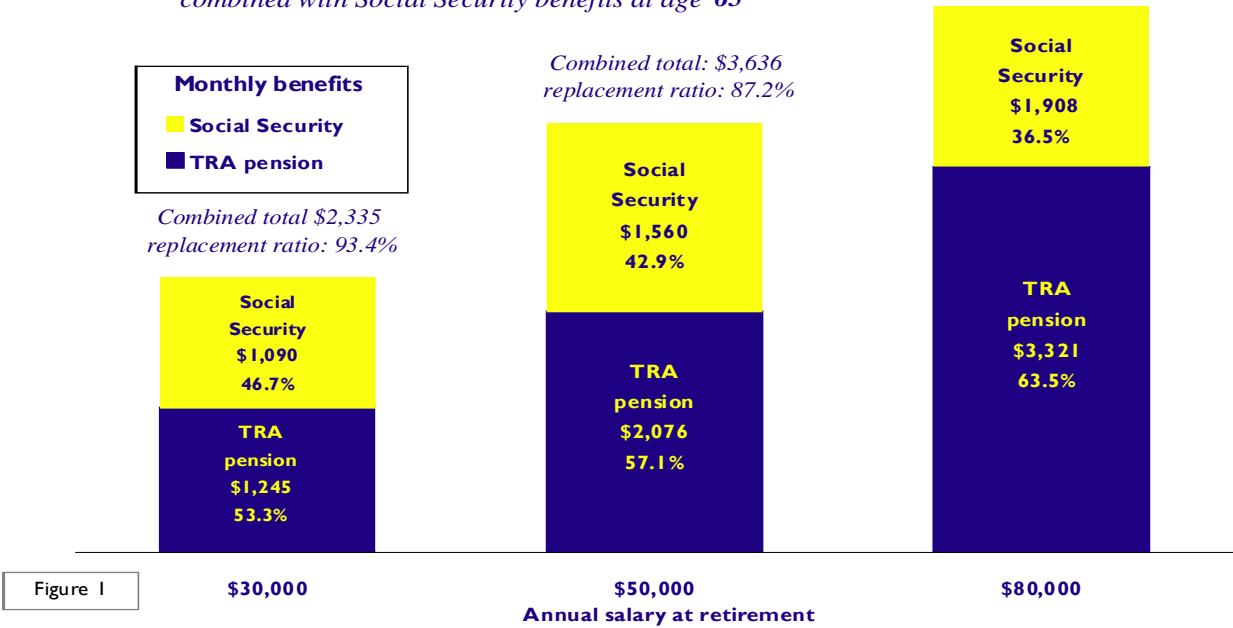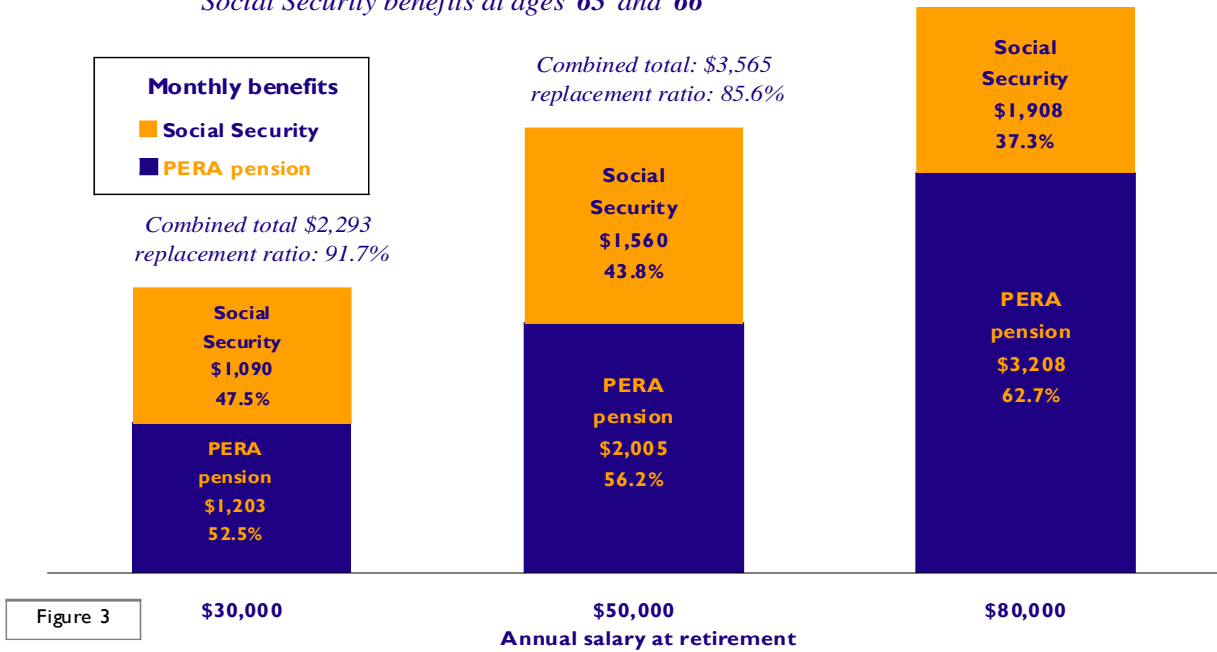| Figure 3 | **$30,000** | **$50,000** | **$80,000** |

**Annual salary at retirement**

\*Workers maintain their standards of living when replacing 80% of working salary by other sources in retirement

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**Replacement ratios\* for three retirement salary levels**

*Pre- and post-1989* **MN State Retirement System** *30-year pensions combined with Social Security benefits at ages* **65** *and* **66**

*Combined total: $5,115 replacement ratio: 76.7%*

**Monthly benefits**
■ Social Security
■ MSRS pension

*Combined total: $3,565 replacement ratio: 85.6%*

**Social Security $1,908 37.3%**

*Combined total $2,293 replacement ratio: 91.7%*

**Social Security $1,560 43.8%**

**MSRS benefit $3,208 62.7%**

**Social Security $1,090 47.5%**

**MSRS pension $2,005 56.2%**

**MSRS pension $1,203 52.5%**

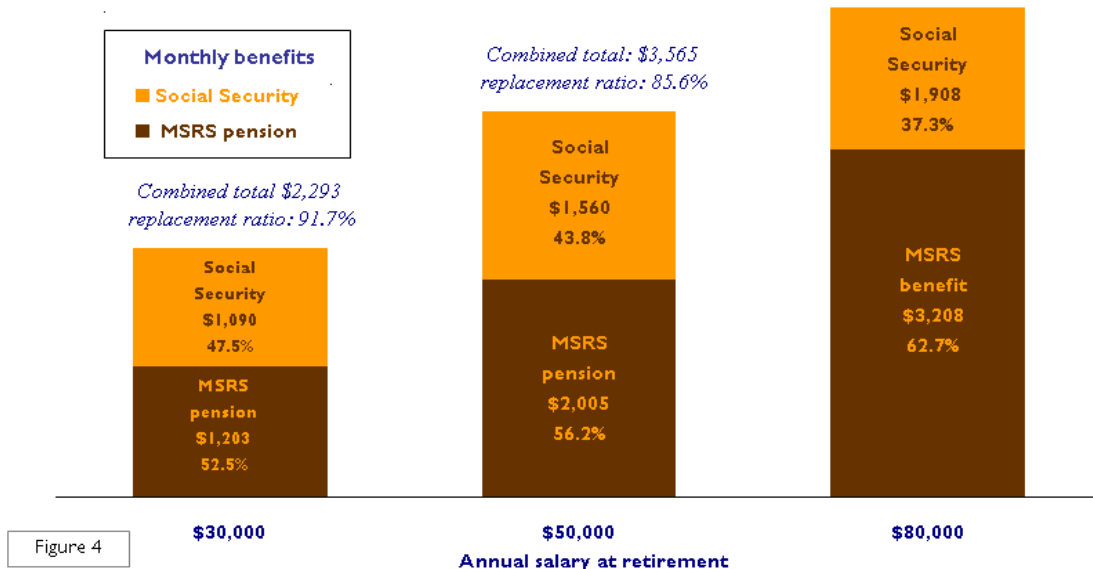| Figure 4 | **$30,000** | **$50,000** | **$80,000** |

**Annual salary at retirement**

\*Workers maintain their standards of living when replacing 80% of working salary by other sources in retirement

## Monthly Dollar Gaps to Replacement Ratio of 90%
## PERA Coordinated 30 years of service, Age 62 Post-1989 benefit levels

**Total needed $2,250**   **Total needed $3,750**   **Total needed $6,000**

Gap in dollars, $521

PERA, Social Security combined $1,729

Gap in dollars, $1,061

PERA, Social Security combined $2,689

Gap in dollars $2,140

PERA, Social Security combined $3,860

Figure 7

$30,000   $50,000   $80,000

*Annual salary levels at retirement*
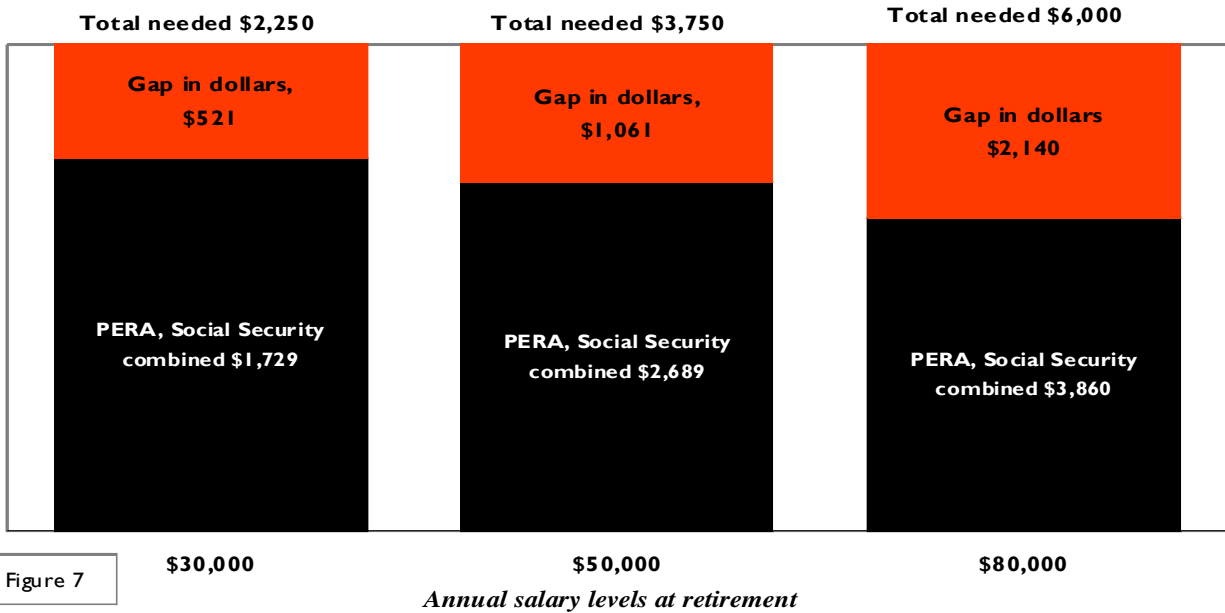
■ PERA Social Security combined   ■ Gap in dollars

## Monthly Dollar Gaps to Replacement Ratio of 90%
## TRA 30 years of service, Age 62 Post-1989 benefit levels

**Total needed $2,250**   **Total needed $3,750**   **Total needed $6,000**

Gap in dollars, $355

TRA Social Security combined, $1,895

Gap in dollars, $786

TRA, Social Security combined, $2,964

Gap in dollars $1,698

TRA, Social Security combined, $4,302

Figure 5

$30,000   $50,000   $80,000
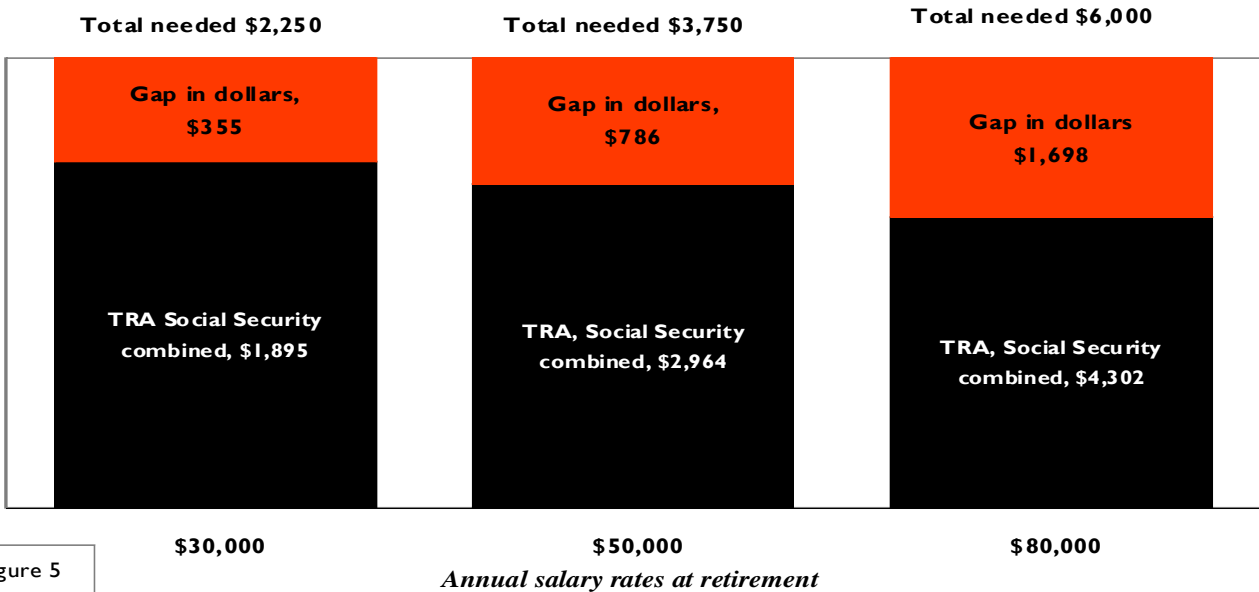
*Annual salary rates at retirement*

■ TRA Social Security combined   ■ Gap in dollars

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## Monthly Dollar Gaps to Replacement Ratio of 90%
## MSRS General Plan 30 years of service, Age 62 Post-1989 benefit levels

| Total needed $2,250 | Total needed $3,750 | Total needed $6,000 |
|---|---|---|
| **Gap in dollars, $499** | **Gap in dollars, $1,024** | **Gap in dollars $2,080** |
| **MSRS, Social Security combined $1,751** | **MSRS, Social Security combined $2,726** | **MSRS, Social Security combined $3,920** |
| $30,000 | $50,000 | $80,000 |

*Annual salary rates at retirement*

Figure 6

■ MSRS Social Security combined          ■ Gap in dollars

### Personal Savings

We must comment on two important factors affecting personal savings. One has to do with the variations among workers regarding their ability or motivation to put money into savings. The other is about actual versus predicted lifetimes.

Our analysis indicates that most employees must accumulate some level of savings while working to be able to continue their standards of living into retirement. The savings rates we have computed assume employees save a fixed percentage of gross pay throughout a 30-year working career. However, many employees will not have begun their savings programs immediately upon entry into public employment. Consequently, to meet savings targets, workers will need to save at higher rates than we have calculated. Retirees did not set savings goals and carry them out may need to return to work to retain their standards of living. If unable to work, however, they will likely need to accept a lower standard of living.

The life expectancy rates used in our analysis are based upon those unique to PERA, MSRS, and TRA. Male and female life expectancies are not identical, females live longer than males. However, to avoid complexity we weighted the rates based on the actual gender mix of each system and then merged them into one life expectancy rate for a particular age. For example, for MSRS and PERA, the "merged" life expectancy following retirement for members age 62 is 22 years. For age 66, however, PERA and MSRS members are predicted to live on average 19 years after retirement. In contrast, TRA members are on average predicted to live longer: 23 years after retirement at age 66 and 26 years after age 62.

Average life expectancies are useful predictions to develop strategies to fund benefits for both current and future members of our retirement plans. The trend has been for members to live longer after retirement than had been predicted decades earlier. Our pension funds can make adjustments over the long term to address these added financial obligations. In contrast, however, individuals cannot rely solely upon "average" life expectancies to determine how much they should personally save for their individual retirements. In fact, studies have suggested individuals should plan to accumulate savings for a "maximum" lifetime so as to reduce the risk of their savings accounts being depleted before death.[**]

An example. If an individual member were to use the average PERA and MSRS life expectancy of 22 years following retirement at age 62, the member would accumulate savings to pay his or her expenses until age 84 (age 62 + 22 years of life = 84). Some members could theoretically live exactly 22 years after retirement, but the majority will live fewer or more than 22 years. Social Security benefits are paid for workers' lifetimes as are Minnesota pensions. Thus, members need not worry that these benefits will stop before death, but they cannot be assured that their personal savings accounts will not run out before then.

As plan administrators, what can we suggest to members about how to plan for their individual lifetimes when they don't know for certain how long they will after retirement? One approach is to save for a maximum expected lifetime, which has been defined as age 97 by Beth Almeida and William B. Fornia, FSA in their research report, *A Better Bang for the Buck*, *The Economic Efficiencies of Defined Benefit Pension Plans*, August 2008.

Almeida and Fornia found that only 10 percent of individuals survive beyond age 97. If age 97 is used as the duration of a member's life, those retiring at age 62 would need to plan to live 35 years after retirement (age 62 + 35 = 97). And retiring at 66 would mean living 31 years afterward (age 66 + 31 = 97). Depending upon each plan's estimates of average lifetime, members planning for age 97 would need to save to cover 8 to 13 additional years of life. Longer lifetimes, of course, would mean that while working members would need to save at significantly higher rates than we estimated in this report.

Members may take into account their family health histories as they decide about how much they need to save for retirement. In reality, however, members will likely save to the degree they are able to do so.

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[**] Research report, *A Better Bang for the Buck*, *The Economic Efficiencies of Defined Benefit Pension Plans*. Beth Almeida and William B. Fornia, FSA August 2008.

## Supplemental Information - MSRS General Plan Retirement Benefits

*Calulations with lower investment returns*

### Tier I before 1989 - Social Security's full retirement age is 66

Dollar values are monthly unless stated otherwise

| | Salary at retirement | Percent of MSRS high five | Annual High-5 salary | Monthly High-5 salary | MSRS benefit | Social Security Benefit | MSRS + Social Security | Replacement Ratio | Monthly Gap in dollars | | Lump Sum needed at retirement* | | Savings rate required** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 80% | 90% | 80% | 90% | 80% | 90% |
| **Age 62** 30 years MSRS 35 SS Service | $30,000 | | $28,303 | $2,359 | $1,085 | $876 | $1,961 | 78.4% | $39 | $289 | $7,544 | $55,816 | 0.71% | 5.22% |
| | $50,000 | 46% | $47,171 | $3,931 | $1,808 | $1,254 | $3,062 | 73.5% | $271 | $688 | $52,397 | $132,851 | 2.94% | 7.46% |
| | $80,000 | | $75,474 | $6,289 | $2,893 | $1,533 | $4,426 | 66.4% | $907 | $1,574 | $175,172 | $303,898 | 6.15% | 10.67% |
| **Age 65** 30 years MSRS 35 SS Service | $30,000 | | $28,303 | $2,359 | $1,203 | $1,090 | $2,293 | 91.7% | ($293) | ($43) | $0 | $0 | 0.00% | 0.00% |
| | $50,000 | 51% | $47,171 | $3,931 | $2,005 | $1,560 | $3,565 | 85.6% | ($232) | $185 | $0 | $33,360 | 0.00% | 1.87% |
| | $80,000 | | $75,474 | $6,289 | $3,208 | $1,908 | $5,115 | 76.7% | $218 | $885 | $39,311 | $159,518 | 1.38% | 5.60% |

### Tier II After 1989 - Social Security's full retirement age is age 67

| | Salary at retirement | Percent of MSRS high five | High-5 salary | Monthly High-5 salary | MSRS benefit | Social Security Benefit | MSRS + Social Security | Replacement Ratio | Monthly Gap in dollars | | Lump sum needed at retirement* | | Savings rate required* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 80% | 90% | 80% | 90% | 80% | 90% |
| **Age 62** 30 years MSRS 35 SS Service | $30,000 | | $28,303 | $2,359 | $933 | $818 | $1,751 | 70.0% | $249 | $499 | $48,164 | $96,436 | 4.51% | 9.02% |
| | $50,000 | 40% | $47,171 | $3,931 | $1,556 | $1,170 | $2,726 | 65.4% | $607 | $1,024 | $117,239 | $197,692 | 6.58% | 11.10% |
| | $80,000 | | $75,474 | $6,289 | $2,489 | $1,431 | $3,920 | 58.8% | $1,414 | $2,080 | $272,944 | $401,670 | 9.58% | 14.10% |
| **Age 66** 30 years MSRS 35 SS Service | $30,000 | | $28,303 | $2,359 | $1,203 | $1,090 | $2,293 | 91.7% | ($293) | ($43) | $0 | $0 | 0.00% | 0.00% |
| | $50,000 | 51% | $47,171 | $3,931 | $2,005 | $1,560 | $3,565 | 85.6% | ($232) | $185 | $0 | $32,124 | 0.00% | 1.80% |
| | $80,000 | | $75,474 | $6,289 | $3,208 | $1,908 | $5,115 | 76.7% | $218 | $885 | $37,854 | $153,607 | 1.33% | 5.39% |

\* Assumes 3% rate of return

\*\*Assumes 5% rate of return

**Adequacy of TRA Retirement Plan Benefits**

**Tier I before 1989 - Social Security full retirement age: 65**

| | Salary at Retirement | High-5 percent | Monthly TRA benefit | Social Security Benefit | TRA + Social Security | Replacement Ratio | Monthly Gap in dollars | | Total savings needed at retirement* | | Savings rate required** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 80% | 90% | 80% | 90% | 80% | 90% |
| **Age 62** | $30,000 | 47.8% | $1,127 | $876 | $2,003 | 80.1% | NA | $247 | $0 | $53,515 | NA | 4.61% |
| 30 years TRA | $50,000 | 47.8% | $1,879 | $1,254 | $3,133 | 75.2% | $201 | $617 | $43,622 | $133,894 | 2.25% | 6.91% |
| 35 SS Service | $80,000 | 47.8% | $3,006 | $1,533 | $4,539 | 68.1% | $795 | $1,461 | $172,436 | $316,958 | 5.57% | 10.23% |
| **Age 65** | $30,000 | 52.8% | $1,245 | $1,090 | $2,335 | 93.4% | NA | NA | $0 | $0 | NA | NA |
| 30 years TRA | $50,000 | 52.8% | $2,076 | $1,560 | $3,636 | 87.2% | NA | $114 | $0 | $22,861 | NA | 1.18% |
| 35 SS Service | $80,000 | 52.8% | $3,321 | $1,908 | $5,229 | 78.4% | $105 | $771 | $21,000 | $153,997 | 0.68% | 4.97% |

**Tier II after 1989 - Social Security full retirement age: 67**

| | Salary at Retirement | High-5 percent | Monthly TRA benefit | Social Security Benefit | TRA + Social Security | Replacement Ratio | Monthly Gap in dollars | | Total savings needed at retirement* | | Savings rate required** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 80% | 90% | 80% | 90% | 80% | 90% |
| **Age 62** | $30,000 | 56.4% | $1,077 | $818 | $1,895 | 75.8% | $105 | $355 | $22,878 | $77,128 | 1.97% | 6.64% |
| 30 years TRA | $50,000 | 56.4% | $1,794 | $1,170 | $2,964 | 71.1% | $370 | $786 | $80,227 | $170,499 | 4.14% | 8.80% |
| 35 SS Service | $80,000 | 56.4% | $2,871 | $1,431 | $4,302 | 64.5% | $1,032 | $1,698 | $223,972 | $368,495 | 7.23% | 11.89% |
| **Age 66** | $30,000 | 56.4% | $1,330 | $1,090 | $2,420 | 96.8% | NA | NA | $0 | $0 | NA | NA |
| 30 years TRA | $50,000 | 56.4% | $2,217 | $1,560 | $3,777 | 90.6% | NA | NA | $0 | $0 | NA | NA |
| 35 SS Service | $80,000 | 56.4% | $3,547 | $1,908 | $5,455 | 81.8% | NA | $545 | $0 | $108,782 | NA | 3.51% |

*Assumes 3% rate of return

**Assumes 5% rate of return

## Adequacy of PERA 's Coordinated Plan Retirement Benefits

**Tier I before 1989 - Social Security's full retirement age is 66**  — Dollar values are monthly unless stated otherwise

| | Salary at retirement | Percent of PERA's high five | Annual High-5 salary | Monthly High-5 salary | PERA benefit | Social Security Benefit | PERA + Social Security | Replacement Ratio | Monthly Gap in dollars | | Lump Sum needed at retirement* | | Savings rate required** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 80% | 90% | 80% | 90% | 80% | 90% |
| **Age 62** 30 years 35 SS Service | $30,000 | 46% | $28,303 | $2,359 | $1,085 | $876 | $1,961 | 78.4% | $39 | $289 | $6,852 | $50,698 | 0.51% | 3.77% |
| | $50,000 | | $47,171 | $3,931 | $1,808 | $1,254 | $3,062 | 73.5% | $271 | $688 | $47,592 | $120,668 | 2.11% | 5.35% |
| | $80,000 | | $75,474 | $6,289 | $2,893 | $1,533 | $4,426 | 66.4% | $907 | $1,574 | $159,109 | $276,031 | 4.43% | 7.69% |
| **Age 65** 30 years PERA 35 SS Service | $30,000 | 51% | $28,303 | $2,359 | $1,203 | $1,090 | $2,293 | 91.7% | ($293) | ($43) | $0 | $0 | 0.0% | 0.00% |
| | $50,000 | | $47,171 | $3,931 | $2,005 | $1,560 | $3,565 | 85.6% | ($232) | $185 | $0 | $30,531 | 0.0% | 1.36% |
| | $80,000 | | $75,474 | $6,289 | $3,208 | $1,908 | $5,115 | 76.7% | $218 | $885 | $35,978 | $145,992 | 1.00% | 4.07% |

**Tier II After 1989 - Social Security's full retirement age is age 67**

| | Salary at retirement | Percent of PERA's high five | High-5 salary | Monthly High-5 salary | PERA benefit | Social Security Benefit | PERA + Social Security | Replacement Ratio | Monthly Gap in dollars | | Lump Sum needed at retirement* | | Savings rate required** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 80% | 90% | 80% | 90% | 80% | 90% |
| **Age 62** 30 years 35 SS Service | $30,000 | 38.63% | $28,303 | $2,359 | $911 | $818 | $1,729 | 69.1% | $271 | $521 | $47,587 | $91,433 | 3.54% | 6.80% |
| | $50,000 | | $47,171 | $3,931 | $1,519 | $1,170 | $2,689 | 64.5% | $645 | $1,061 | $113,062 | $186,139 | 5.01% | 8.25% |
| | $80,000 | | $75,474 | $6,289 | $2,430 | $1,431 | $3,860 | 57.9% | $1,473 | $2,140 | $258,329 | $375,251 | 7.20% | 10.46% |
| **Age 66** 30 years PERA 35 SS Service | $30,000 | 51% | $28,303 | $2,359 | $1,203 | $1,090 | $2,293 | 91.7% | ($293) | ($43) | $0 | $0 | 0.0% | 0.0% |
| | $50,000 | | $47,171 | $3,931 | $2,005 | $1,560 | $3,565 | 85.6% | ($231) | $185 | $0 | $29,549 | 0.0% | 1.32% |
| | $80,000 | | $75,474 | $6,289 | $3,208 | $1,908 | $5,116 | 76.7% | $218 | $884 | $34,729 | $141,078 | 0.97% | 3.93% |

*Assumes 4% rate of return

**Assumes 7% rate of return

## Adequacy of MSRS General Plan Retirement Benefits

### Tier I before 1989 - Social Security's full retirement age is 66

Dollar values are monthly unless stated otherwise

| | Salary at retirement | Percent of MSRS high five | Annual High-5 salary | Monthly High-5 salary | MSRS benefit | Social Security Benefit | MSRS + Social Security | Replacement Ratio | Monthly Gap in dollars | | Lump Sum needed at retirement* | | Savings rate required** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 80% | 90% | 80% | 90% | 80% | 90% |
| **Age 62** 30 years MSRS 35 SS Service | $30,000 | | $28,303 | $2,359 | $1,085 | $876 | $1,961 | 78.4% | $39 | $289 | $6,852 | $50,698 | 0.51% | 3.77% |
| | $50,000 | 46% | $47,171 | $3,931 | $1,808 | $1,254 | $3,062 | 73.5% | $271 | $688 | $47,592 | $120,668 | 2.11% | 5.35% |
| | $80,000 | | $75,474 | $6,289 | $2,893 | $1,533 | $4,426 | 66.4% | $907 | $1,574 | $159,109 | $276,031 | 4.43% | 7.69% |
| **Age 65** 30 years MSRS 35 SS Service | $30,000 | | $28,303 | $2,359 | $1,203 | $1,090 | $2,293 | 91.7% | ($293) | ($43) | $0 | $0 | 0.0% | 0.00% |
| | $50,000 | 51% | $47,171 | $3,931 | $2,005 | $1,560 | $3,565 | 85.6% | ($232) | $185 | $0 | $30,531 | 0.0% | 1.36% |
| | $80,000 | | $75,474 | $6,289 | $3,208 | $1,908 | $5,115 | 76.7% | $218 | $885 | $35,978 | $145,992 | 1.00% | 4.07% |

### Tier II After 1989 - Social Security's full retirement age is age 67

| | Salary at retirement | Percent of MSRS high five | High-5 salary | Monthly High-5 salary | MSRS benefit | Social Security Benefit | MSRS + Social Security | Replacement Ratio | Monthly Gap in dollars | | Lump Sum needed at retirement* | | Savings rate required** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 80% | 90% | 80% | 90% | 80% | 90% |
| **Age 62** 30 years MSRS 35 SS Service | $30,000 | | $28,303 | $2,359 | $933 | $818 | $1,751 | 70.0% | $249 | $499 | $43,748 | $87,593 | 3.25% | 6.31% |
| | $50,000 | 40% | $47,171 | $3,931 | $1,556 | $1,170 | $2,726 | 65.4% | $607 | $1,024 | $106,488 | $179,564 | 4.75% | 8.01% |
| | $80,000 | | $75,474 | $6,289 | $2,489 | $1,431 | $3,920 | 58.8% | $1,414 | $2,080 | $247,915 | $364,837 | 6.91% | 10.17% |
| **Age 66** 30 years MSRS 35 SS Service | $30,000 | | $28,303 | $2,359 | $1,203 | $1,090 | $2,293 | 91.7% | ($293) | ($43) | $0 | $0 | 0.0% | 0.0% |
| | $50,000 | 51% | $47,171 | $3,931 | $2,005 | $1,560 | $3,565 | 85.6% | ($231) | $185 | $0 | $29,549 | 0.0% | 1.32% |
| | $80,000 | | $75,474 | $6,289 | $3,208 | $1,908 | $5,116 | 76.7% | $218 | $884 | $34,729 | $141,078 | 0.97% | 3.93% |

*Assumes 4% rate of return
** Assumes 7% rate of return

## Adequacy of TRA Retirement Plan Benefits

### Tier I before 1989 - Social Security's full retirement age is 66

Dollar values are monthly unless stated

| | Salary at Retirement | Percent of TRA's High-5 | Annual High-5 Salary | Monthly High-5 Salary | TRA benefit | Social Security Benefit | TRA + Social Security | Replacement Ratio | Monthly Gap in dollars | | Lump Sum needed at retirement* | | Savings rate required** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 80% | 90% | 80% | 90% | 80% | 90% |
| **Age 62** 30 | $30,000 | | $28,303 | $2,359 | $1,127 | $876 | $2,003 | 80.1% | ($3) | $247 | $0 | $47,948 | 0.00% | 3.25% |
| years TRA | $50,000 | 47.8% | $47,171 | $3,931 | $1,879 | $1,254 | $3,133 | 75.2% | $201 | $617 | $39,084 | $119,965 | 1.59% | 4.88% |
| 35 SS Service | $80,000 | | $75,474 | $6,289 | $3,006 | $1,533 | $4,539 | 68.1% | $795 | $1,461 | $154,498 | $283,986 | 3.93% | 7.22% |
| **Age 65** 30 | $30,000 | | $28,303 | $2,359 | $1,245 | $1,090 | $2,335 | 93.4% | ($335) | ($85) | $0 | $0 | 0.00% | 0.00% |
| years TRA | $50,000 | 52.8% | $47,171 | $3,931 | $2,076 | $1,560 | $3,636 | 87.2% | ($302) | $114 | $0 | $20,705 | 0.00% | 0.77% |
| 35 SS Service | $80,000 | | $75,474 | $6,289 | $3,321 | $1,908 | $5,229 | 78.4% | $105 | $771 | $19,019 | $139,474 | 0.48% | 3.54% |

### Tier II after 1989 - Social Security FRA:  Age 67

| | Salary at Retirement | Percent of TRA's High-5 | Annual High-5 Salary | Monthly High-5 Salary | TRA benefit | Social Security Benefit | TRA + Social Security | Replacement Ratio | Monthly Gap in dollars | | Lump Sum needed at retirement* | | Savings rate required** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 80% | 90% | 80% | 90% | 80% | 90% |
| **Age 62** 30 | $30,000 | | $28,303 | $2,359 | $1,077 | $818 | $1,895 | 75.8% | $105 | $355 | $20,498 | $69,105 | 1.39% | 4.68% |
| years TRA | $50,000 | 56.4% | $47,171 | $3,931 | $1,794 | $1,170 | $2,964 | 71.1% | $370 | $786 | $71,881 | $152,762 | 2.92% | 6.21% |
| 35 SS Service | $80,000 | | $75,474 | $6,289 | $2,871 | $1,431 | $4,302 | 64.5% | $1,032 | $1,698 | $200,673 | $330,161 | 5.10% | 8.39% |
| **Age 66** 30 | $30,000 | | $28,303 | $2,359 | $1,330 | $1,090 | $2,420 | 96.8% | ($420) | ($170) | $0 | $0 | 0.00% | 0.00% |
| years TRA | $50,000 | 56.4% | $47,171 | $3,931 | $2,217 | $1,560 | $3,777 | 90.6% | ($443) | ($27) | $0 | $0 | 0.00% | 0.00% |
| 35 SS Service | $80,000 | | $75,474 | $6,289 | $3,547 | $1,908 | $5,455 | 81.8% | ($121) | $545 | $0 | $98,523 | 0.00% | 2.50% |

\* Assumes 4% rate of return

\*\* Assumes 7% rate of return

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## Supplemental Information - PERA's Coordinated Plan Retirement Benefits

*Calulations with lower investment returns*

### Tier I before 1989 - Social Security's full retirement age is 66

Dollar values are monthly unless stated otherwise

| | Salary at retirement | Percent of PERA's high five | Annual High-5 salary | Monthly High-5 salary | PERA benefit | Social Security Benefit | PERA + Social Security | Replacement Ratio | Monthly Gap in dollars | | Lump Sum needed at retirement* | | Savings rate required** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 80% | 90% | 80% | 90% | 80% | 90% |
| **Age 62** 30 years PERA 35 SS Service | $30,000 | | $28,303 | $2,359 | $1,085 | $876 | $1,961 | 78.4% | $39 | $289 | $7,544 | $55,816 | 0.71% | 5.22% |
| | $50,000 | 46% | $47,171 | $3,931 | $1,808 | $1,254 | $3,062 | 73.5% | $271 | $688 | $52,397 | $132,851 | 2.94% | 7.46% |
| | $80,000 | | $75,474 | $6,289 | $2,893 | $1,533 | $4,426 | 66.4% | $907 | $1,574 | $175,172 | $303,898 | 6.15% | 10.67% |
| **Age 65** 30 years PERA 35 SS Service | $30,000 | | $28,303 | $2,359 | $1,203 | $1,090 | $2,293 | 91.7% | ($293) | ($43) | $0 | $0 | 0.00% | 0.00% |
| | $50,000 | 51% | $47,171 | $3,931 | $2,005 | $1,560 | $3,565 | 85.6% | ($232) | $185 | $0 | $33,360 | 0.00% | 1.87% |
| | $80,000 | | $75,474 | $6,289 | $3,208 | $1,908 | $5,115 | 76.7% | $218 | $885 | $39,311 | $159,518 | 1.38% | 5.60% |

### Tier II After 1989 - Social Security's full retirement age is age 67

| | Salary at retirement | Percent of PERA's high five | High-5 salary | Monthly High-5 salary | PERA benefit | Social Security Benefit | PERA + Social Security | Replacement Ratio | Monthly Gap in dollars | | Lump sum needed at retirement* | | Savings rate required** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 80% | 90% | 80% | 90% | 80% | 90% |
| **Age 62** 30 years PERA 35 SS Service | $30,000 | | $28,303 | $2,359 | $911 | $818 | $1,729 | 69.1% | $271 | $521 | $52,391 | $100,664 | 4.90% | 9.42% |
| | $50,000 | 38.63% | $47,171 | $3,931 | $1,519 | $1,170 | $2,689 | 64.5% | $645 | $1,061 | $124,477 | $204,931 | 6.99% | 11.51% |
| | $80,000 | | $75,474 | $6,289 | $2,430 | $1,431 | $3,860 | 57.9% | $1,473 | $2,140 | $284,409 | $413,135 | 9.98% | 14.50% |
| **Age 66** 30 years PERA 35 SS Service | $30,000 | | $28,303 | $2,359 | $1,203 | $1,090 | $2,293 | 91.7% | ($293) | ($43) | $0 | $0 | 0.00% | 0.00% |
| | $50,000 | 51% | $47,171 | $3,931 | $2,005 | $1,560 | $3,565 | 85.6% | ($232) | $185 | $0 | $32,124 | 0.00% | 1.80% |
| | $80,000 | | $75,474 | $6,289 | $3,208 | $1,908 | $5,115 | 76.7% | $218 | $885 | $37,854 | $153,607 | 1.33% | 5.39% |

*Assumes 3% rate of return

** Assumes 5% rate of return